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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,980	11/06/2001	Ja-Hum Ku	SAM-0266	7596

7590

12/26/2002

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EXAMINER

LEE, CALVIN

ART UNIT

PAPER NUMBER

2825

DATE MAILED: 12/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/992,980

Applicant(s)
KU et al.

Examiner
Calvin Lee

Art Unit
2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Nov 6, 2001 is/are a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other: _____

OFFICE ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Pg. 3, ln. 23 and pg. 4, ln. 1, replace "tungsten oxide 13c" with --tungsten oxide 12c--

Claim Objection

2. Claim 4 is objected to because of the following informalities:

Claim 4, line 4, replace "the nitrogen decreasing surface mobility of the metal oxide layer and preventing" with --, decreases surface mobility of the metal oxide layer and prevents--

Claim Rejections - 35 U.S.C. § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -
(e) the invention was described in a patent granted on an application for patent by another filed in the US before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 37 of this title before the invention by the applicant for patent

4. Claims 1-3 and 5-7 are rejected under 35 U.S.C. 102(e) as anticipated by *Tanabe et al.* (US 6,323,115).

Tanabe discloses a method of forming a metal gate electrode, comprising the steps of:

- forming the metal gate electrode **15p** comprised of a silicon layer **10p**, a WN (tungsten nitride) barrier layer **11**, and a W (tungsten) layer **12** [Fig. 7, 19a and col. 14]
- performing a selective oxidation process to the metal gate electrode pattern in a nitrogen-containing gas ambient [Fig. 19b and col. 18]

In re claim 2, *Tanabe* teaches the nitrogen-containing gas ambient including one or more gases selected from the group consisting of nitrogen oxide and ammonia [Fig. 17]

In re claim 3, *Tanabe* inherently teaches the nitrogen-containing gas suppressing oxidation of the metal WN and W layers because *Tanabe* discloses "oxidation of a refractory metal film can be suppressed" [col. 20]

In re claims 5-8, *Tanabe* teaches oxygen and hydrogen being used as a source gas in the oxidation process [Figs. 11]

Claim Rejections - 35 U.S.C. § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention made

6. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanabe*, as applied to claim 1.

Tanabe does not suggest that "the nitrogen permeates a metal oxide layer ..., decreases surface mobility of the metal oxide layer and prevents formation of nucleation cities of whiskers on the metal oxide layer.

It would have been obvious to one having ordinary skill in the art to have modified the process of *Tanabe* by utilizing the claimed functional recitation because it is notoriously well known in the art as seen by the plethora of prior art cited above and also in US 4,505,028 to

Kobayashi et al. [cols. 3-6], US 5,633,212 to *Yuuki* [cols. 4-5], and US 6,348,380 to *Weimer et al.* [cols. 5 and 8-11].

They all teaches that only silicon-containing layer is selectively oxidized (without oxidizing a metal layer) as a result of performing a selective oxidation process to a semiconductor structure in a nitrogen-containing gas ambient (including water vapor and/or hydrogen). An oxide film being formed with the selective oxidation must has a dense film quality (compared to other oxide films formed by a conventional thermal oxidation), thereby improving electrical insulation. Consequently, whiskers or hillocks are less likely formed on the structure.

Moreover, Applicant is reminded that the functional recitation, unless being expressed as a "means" for performing the specified function (as set forth in 35 USC § 112 6th paragraph) and supported by recitation in the claim of sufficient structure to warrant the presence of the functional language, has not been given patentable weight because it is narrative in form. *In re Fuller*, 1929 C.D. 172; 388 O.G. 279.

Any inquiry concerning this communication should be directed to Patent Examiner *Calvin Lee* at (703) 306-5854 from 7:00 to 17:00 (Monday-Thursday). If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2825's Supervisory Patent Examiner *Matthew Smith* whose telephone number is (703) 308-1323.

Any inquiry relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0596. The fax phones are (703) 872-9318 for regular communications and (703) 872-9319 for After-Final communications.

CL

December 20, 2002

C. Ruestig
CARIDAD E. RUESTIG
PRIMARY EXAMINER